# Case Studies – Resolving complex serological problems

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# Case Studies

- Polyagglutination
- Antibody to a high-prevalence antigen
- Antibody to a low-prevalence antigen

# Patient case 2011

- Male child; d.o.b. 2009-10-08
- Sample sent for ABO/Rh & antibody screen and DAT

| Anti-A | Anti-A | Anti-B | Anti-B | Anti-D | Anti-D | Rh ctrl |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 4+ | 4+ | 1+ |

| S I | S II | S III | DAT |
|---|---|---|---|
| 0 | 0 | 0 | 2+ |

Group O, Rh NT
DAT positive, Ab screen negative
Sample sent to Regional laboratory

# Repeat ABO type/screen & DAT

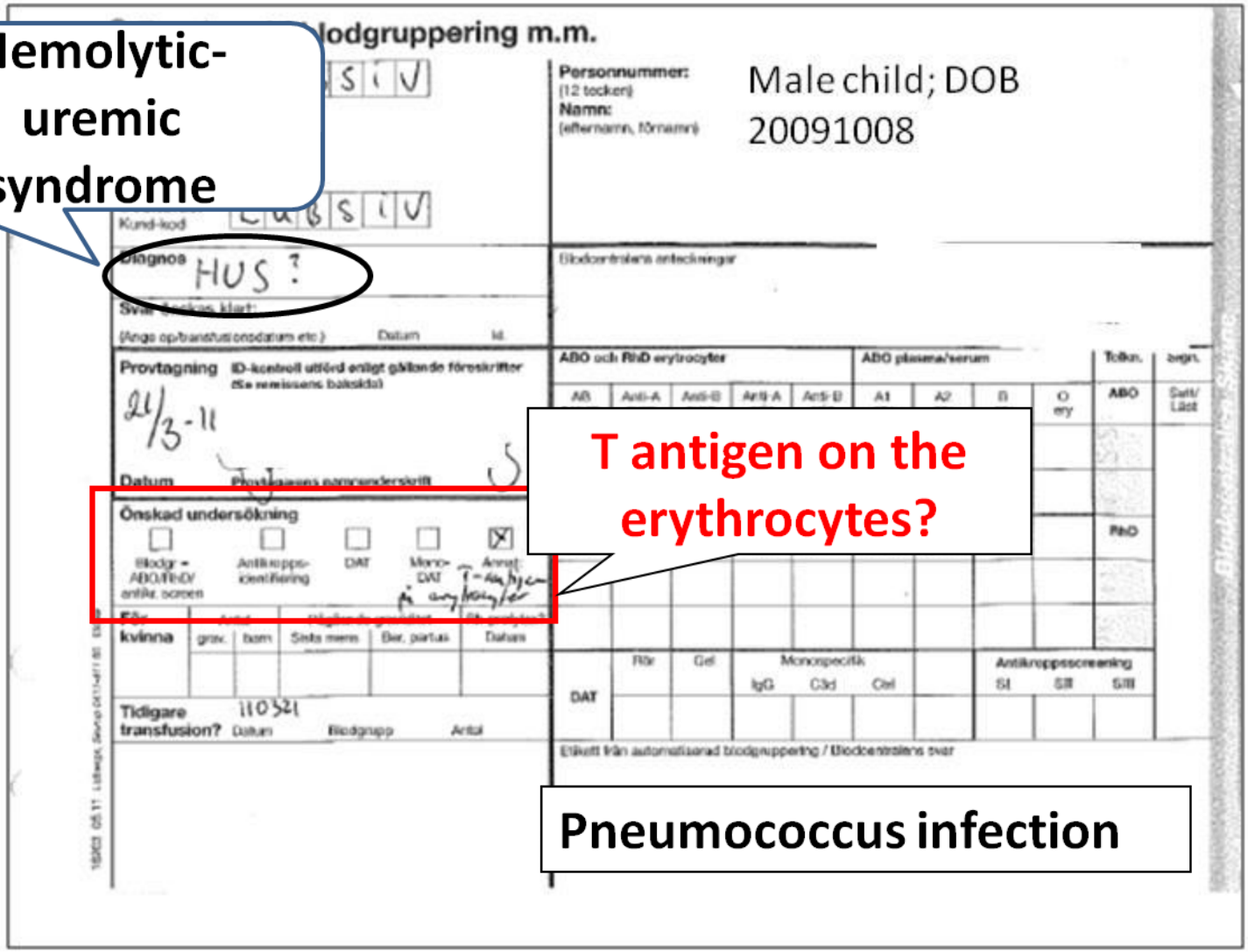
| Anti-A | Anti-B | Anti-D | Anti-D | A1 RBCs | B RBCs |
|---|---|---|---|---|---|
| 0 | 0 | 3+ | 4+ | 4+ | 2+ |

| S I | S II | S III |
|---|---|---|
| 0 | 0 | 0 |

| Anti-IgG | Anti-C3d | Ctrl |
|---|---|---|
| 0 | 4+ | 0 |

Group O, RhD-positive
DAT positive, C3d on RBCs
Antibody screen negative

# Patient case – new sample



# How can T-activation be detected in the laboratory?

| Lectin | RBCs | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | Tk | Th | Tx | Tn | Cad | Nor | VA | HEMPAS | $HbM_{Hyde\ Park}$ | Acquired-B |
| *Griffonia simplicifolia I* | 0 | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 | + |
| *Griffonia simplicifolia II* | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 | 0 | + | 0 |
| *Dolichos biflorus* | 0 | 0 | 0 | 0 | + | + | 0 | 0 | 0 | 0 | w/0 |
| *Helix pomatia* | + | 0 | / | / | + | + | 0 | + | + | + | + |
| *Phaseolus limensis* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | / | + |
| *Leonorus cardiaca* | 0 | 0 | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 |
| *Arachis hypogaea* | + | + | + | + | 0 | 0 | 0 | 0 | 0 | w | (+) |
| *Glycine max* | + | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | + | 0 |
| *Salvia horminum* | 0 | 0 | 0 | 0 | + | + | 0 | 0 | 0 | w | 0 |
| *Salvia sclarea* | 0 | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ulex europaeus*† | > | ≤ | = | = | ≥ | ≤ | = | ≤ | ≤ | > | = |
| *Vicia cretica* | + | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 | w | 0 |

Judd's Methods in Immunohematology, 3rd ed. 2008

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|---|---|---|---|---|---|---|---|---|---|---|---|
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| *Griffonia simplicifolia I* | 0 | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 | + |
| *Griffonia simplicifolia II* | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 | 0 | + | 0 |
| *Dolichos biflorus* | 0 | 0 | 0 | 0 | + | + | 0 | 0 | 0 | 0 | w/0 |
| *Helix pomatia* | + | 0 | / | / | + | + | 0 | + | + | + | + |
| *Phaseolus limensis* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | / | + |
| *Leonorus cardiaca* | 0 | 0 | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 |
| *Arachis hypogaea* | + | + | + | + | 0 | 0 | 0 | 0 | 0 | w | (+) |
| *Glycine max* | + | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | + | 0 |
| *Salvia horminum* | 0 | 0 | 0 | 0 | + | + | 0 | 0 | 0 | w | 0 |
| *Salvia sclarea* | 0 | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ulex europaeus*[†] | > | ≤ | = | = | ≥ | ≤ | = | ≤ | ≤ | > | = |
| *Vicia cretica* | + | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 | w | 0 |

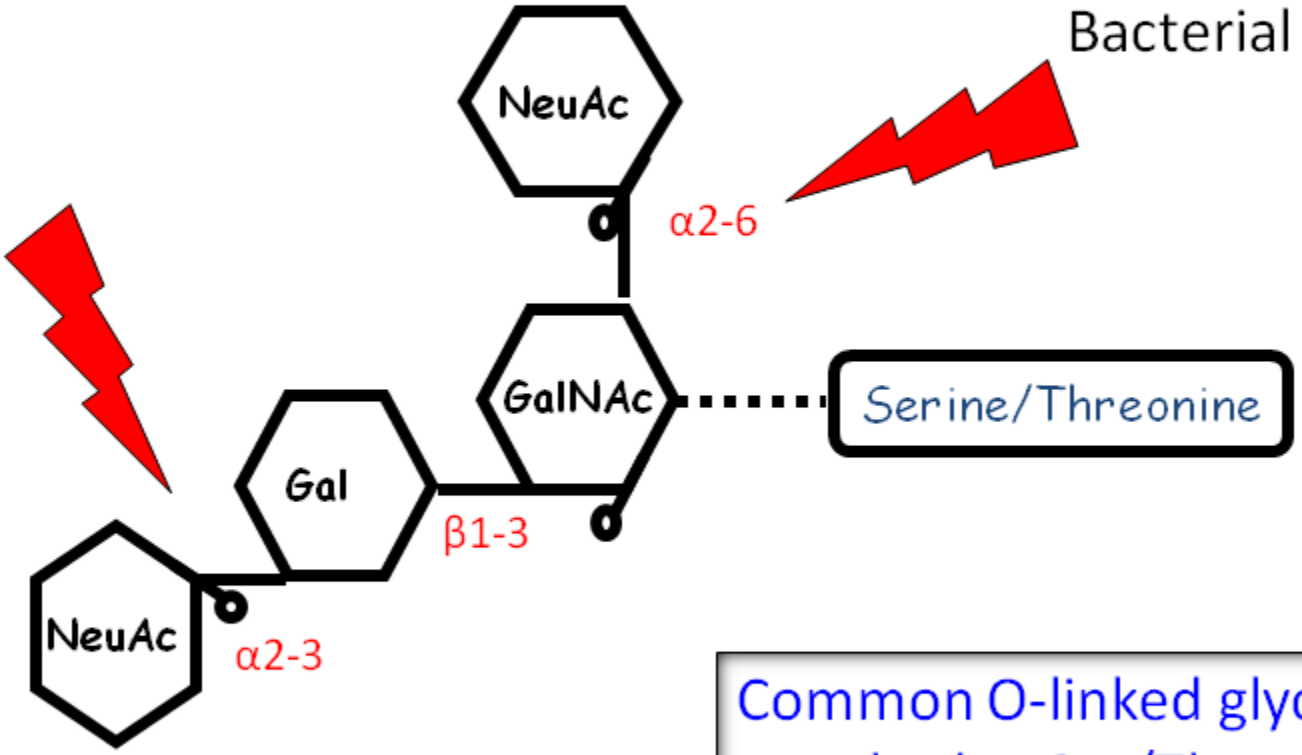
Patient's cells

++++
++++
0
0

# Conclusions

- Patient is O RhD+, DAT+: IgG 0 C3d 4+
- Current Recommendations:
  - Washed RBCs and platelets
  - Avoid plasma (naturally occurring anti-T)

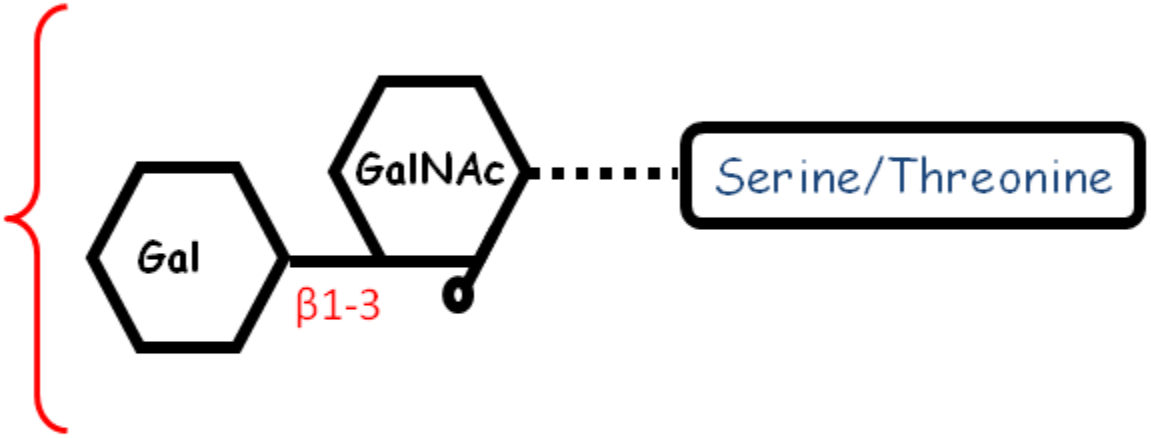
# What is T-activation?




Common O-linked glycan attached to Ser/Thr residues, e.g. on glycophorin A

# What is T-activation?

T antigen




All human sera contain anti-T

# How common is T-activation in HUS?

RARE!

Waters AM, Kerecuk L, Luk D, et al. Hemolytic uremic syndrome associated with invasive pneumococcal disease: the United kingdom experience. J Pediatr. 2007;151(2):140-4.

- 43 cases of pneumococcal HUS 1998-2005
- Median age 13 months (range 5-39 months)
- Pneumococcal infection identified in 34/43
- T-activation in 36 cases
- **Mortality** 11%

# Blood component therapy – current practice/dogma

- Washed RBCs
- No plasma
- Washed platelets
- What the patient received:
  - 3 units O RhD– RBCs 20/3
  - 2 units AB RhD– plasma 20/3
  - 1 unit O RhD– platelets 21/3
  - 2 units O RhD+ washed RBCs 22/3

# Polyagglutination

| Acquired | Genetic |
| --- | --- |
| acquired-B | Cad |
| T | Hb M$^{\text{Hyde Park}}$ |
| Tk | HEMPAS |
| Th | Nor |
| Tx | Tn |
| VA | |
| Tr | |

# Clinical Findings

## microbial-induced polyagglutination

- septicemia
- carcinoma of the colon
- other lesions of the bowel, GI tract
- wound infections
- neonatal necrotizing enterocolitis

ORIGINAL ARTICLE

# Thomsen-Friedenreich activation in infants with necrotizing enterocolitis in Taiwan

*Lin-Yen Wang, Yung-Shu Chan, Feng-Chuan Chang, Chang-Ling Wang, and Marie Lin*

43 infants with necrotizing enterocolitis
4/43 T-activation

Transfusion 2011; 51:1972-6

| Infant with NEC | With T activation | Without T activation | Total | p value |
|---|---|---|---|---|
| Number of patients | 4 | 39 | 43 | |
| Gestational age at birth (weeks) | 28 (26-32)* | 29 (24-39)* | 29 (24-39)* | 0.519 |
| Birth weight (g) | 1160 (856-1800)* | 1256 (520-3500)* | 1170 (520-3500)* | 0.494 |
| Male:female ratio (n) | 1:3 | 27:12 | 28:15 | 0.08 |
| Surgery | 1 | 29 | 30 | 0.312 |
| Age at onset of NEC (days) | 22.5 (20-26)* | 14 (2-52)* | 15 (2-52)* | 0.514 |
| NEC Bell Stage II | 3 | 13 | 16 | 0.105 |
| NEC Bell Stage III | 1 | 26 | 27 | 0.105 |
| Antibiotics given before the diagnosed NEC (days) | 7 (5-7)* | 7 (0-30)* | 7 (0-30)* | 0.564 |
| Sepsis | 2 | 8 | 10 | 0.192 |
| Mortality | 0 | 7 | 7 | 0.366 |
| RBCs | 4† | 31 | 35 | 0.326 |
| FFP | 0 | 17 | 17 | 0.093 |
| PLTs | 0 | 19 | 19 | 0.064 |

# Polyagglutination - Summary

An atypical finding in which RBCs are agglutinated by allogeneic blood group-compatible adult human sera, but not by sera from newborns

- bacterial enzymes
- incomplete RBC membrane biosynthesis
- genetic factors

# Case 2 – Lab referral

- 26 year-old woman, Serbian origin
- Second pregnancy
- Antibody reacted 2+ with all panel RBCs
  - Titre 32
  - 3+ with PEG
  - Autologous RBCs negative
- Did not react with papain-treated RBCs
- Reactive with A1 & A2 RBCs, and cord RBCs
- DAT-negative

Alloantibody

Not anti-H

developed at birth

# RED BLOOD CELL TYPING REPORT

DNA genotyping by ID|CORE+

| Patient/Donor Information | Test Ordering Information | |
|---|---|---|
| Full Name: | Ordered by: | |
| Patient or donor #: | Institution: | |
| **Sample Information** | **Test Performed** | |
| Sample ID#: [redacted] | **Test Type:** IDCore+; PGKWS v2.0<br>Developed by Progenika Biopharma, S.A.<br>www.progenika.com | CE |
| Sample Type: DNA | | |
| Accession date: 23/8/2013 | Lot#: IDCP01010022 | |

| Blood Group | Genotype | Predicted Phenotype | |
|---|---|---|---|
| RHCE | Cc | C | + |
| | | c | + |
| | r's No variant | | |
| | Ee | E | + |
| | | e | + |
| | Cx No variant | Cx | 0 |
| | Cw No variant | Cw | 0 |
| | VS No variant | VS | 0 |
| KELL | kk | K | 0 |
| | | k | + |
| | KPB/KPB | Kpa | 0 |
| | | Kpb | + |
| | Kmod No variant | | |
| | JsB/JsB | Jsa | 0 |
| | | Jsb | + |
| KIDD | JKA/JKB | Jka | + |
| | | Jkb | + |
| | Jk null NO JKnull | | |
| DUFFY | FYA/FYB | Fya | + |
| | | Fyb | + |
| | NO FYX | | |
| | NO FYGATA | | |
| MNS | MM | M | + |
| | | N | 0 |
| | SS | S | + |
| | | s | 0 |
| | U No variant | U | + |
| | GPMur No variant | GPMur | 0 |
| DIEGO | DIB/DIB | Dia | 0 |
| | | Dib | + |
| DOMBROCK | DOA/DOB | Doa | + |
| | | Dob | + |
| | Hy No variant | Hy | + |
| | Joa No variant | Joa | + |
| COLTON | COA/COA | Coa | + |
| | | Cob | 0 |
| CARTWRIGHT | YTA/YTB | Yta | + |
| | | Ytb | + |

**Recommendations**

We recommend that the test should always be interpreted within the clinical context of the donor/patient as well as serology data.

**Notes**

+: Normal antigen expression
0: undetectable antigen expression
+w: Weak antigen expression
NC: No call, result inconclusive
NV: Not valid, test should be repeated

**Comments**

**Group A RhD+**
**K–, N–, s–**

**Review & Approval**

Date:

Technician:

Laboratory Responsible:

Namn: [redacted]

Beställare: GÖBLSA

Provt.datum: 26/8

Analysdatum: 29/8

Labtext: BP 24/9-13

| Testery | IAT gel | Pap gel | IAT/ PEG | IAT rör | NaCl rör |
|---|---|---|---|---|---|
| Egna | — | — | | | |
| AK 1 | ++ | + | | | |
| AK 2 | ++ | + | | | |
| AK 3 | ++ | + | | | |
| AK 4 | ++ | + | | | |
| AK 5 | ++ | + | | | |
| AK 6 | ++ | + | | | |
| AK 7 | ++ | + | | | |
| AK 8 | + | + | | | |
| AK 9 | ++ | + | | | |
| AK 10 | ++ | + | | | |
| AK 11 | ++ | + | | | |
| Kontr. | | ++ | | | |
| Datum | 26/8 | 28/8 | | | |
| Satt/Läst | PW GP | PW GP | | | |

| DAT | Rör | Gel | IgG | C3d | ctl gel |
|---|---|---|---|---|---|
| | | | | | |
| Datum | | | | | |
| Satt/Läst | | | | | |

NOTERING

| Testery | IAT gel | Gel Station | Pap gel | IAT/ PEG | IAT rör | NaCl rör |
|---|---|---|---|---|---|---|
| S 1 | | + | | | | |
| S 2 | | + | | | | |
| S 3 | | + | | | | |
| B 1 | | | | | | |
| B 2 | | | | | | |
| B 3 | | | | | | |
| B 4 | | | | | | |
| Kontr. | | | | | | |
| Datum | | | | | | |
| Satt/Läst | | | | | | |

| Fenotypning | |
|---|---|
| Antigen | Lu$^b$ |
| Pos | ++ |
| Neg | |
| Susp 1 | ++ |
| Susp 2 | |
| Datum | 29/8 |
| Satt | GP |
| Läst | HMG |

UTLÅTANDE

Antibody to a high frequency antigen?

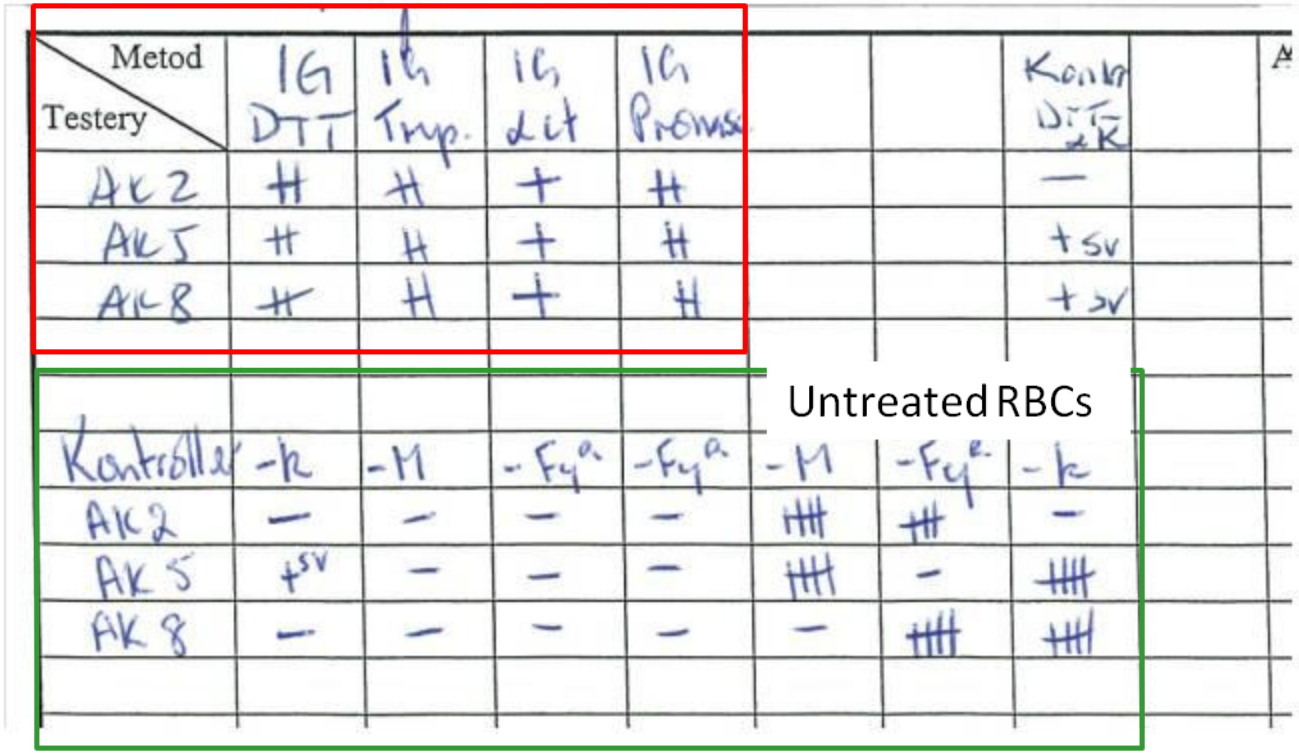
Guesswork – Knops system antigens not enhanced by papain; common "nuisance" (clinically insignificant) antibody

| Me / Testery | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MHOS1243 | + | | | | | | | | Kn$^{a-}$ |
| RNG ID W00435920 | + | | | | | | | | Kn$^{a-}$ |
| SP 90512 | + | | | | | | | | Kn$^{a-}$ |
| HS20101071 7 | + | | | | | | | | Ge- 2,3 |
| [redacted] KAPed | + | | | | | | | | JMH- |
| MMF | + | | | | | | | | Yt$^{a-}$ |

Guesswork – referring lab found it non-reactive with papain-treated RBCs

| Papain | Possible specificity |
|---|---|
| 0 | MNS, Ge, Fy, Xg$^{a}$, Ch/Rg, In, JMH |
| +/0 | Yt |
| + | Cromer, Knops, Lu, Do, AnWj, Raph, Kell, LW, Sc<br>ABO, P1, Rh, Le, Jk, Fy3, Di, Co, Ge3, Ok$^{a}$, Ii, P, At$^{a}$, Cs$^{a}$,<br>Emm, Er$^{a}$, Jr$^{a}$, Lan, Sd$^{a}$, PEL, MAM, ABTI,Vel, Kx |

# Enzymes and DTT



| Metod / Testery | IG DTT | IG Tryp. | IG alk | IG Pronas | | | Konk DTT +K | |
|---|---|---|---|---|---|---|---|---|
| AK 2 | ++ | ++ | + | ++ | | | — | |
| AK 5 | ++ | ++ | + | ++ | | | +sv | |
| AK 8 | ++ | ++ | + | ++ | | | +sv | |
| | | | | | | | | |
| Kontroller | -k | -M | -$Fy^a$ | -$Fy^a$ | -M | -$Fy^a$ | -k | |
| AK 2 | — | — | — | — | ++++ | ++++ | — | |
| AK 5 | +sv | — | — | — | ++++ | — | ++++ | |
| AK 8 | — | — | — | — | — | ++++ | ++++ | |

Untreated RBCs

Not affected by DTT, trypsin or pronase
Weaker with α-chymotrypsin

# Antigen sensitivity

| Papain | Trypsin | α-ct | Pronase | DTT | Möjligt specificitet |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | + | Ch/Rg, $Xg^a$ |
| 0 | 0 | 0 | 0 | 0 | In, JMH |
| 0 | 0 | + | 0 | + | MN, $En^aTS$, Ge2, Ge4 |
| 0/+ | + | 0 | 0 | + | 'N', Ss, $Fy^a/Fy^b$, Fy6 |
| 0/+ | + | 0 | 0 | 0 | $Yt^a$ |
| 0 | + | + | 0 | + | $En^aFS$ |
| + | 0 | 0 | 0 | $+^w$ | Lu, MER2 |
| + | 0 | 0 | + | $+^w$ | Knops |
| + | + | + | + | 0 | Kell |
| + | + | + | $+^w/0$ | 0 | Sc |
| + | 0 | $+^w$ | 0 | 0 | Do, Ge3 |
| + | + | 0 | 0 | 0 | Cromer, |
| + | + | $+^w$ | 0 | 0 | LW |
| + | + | + | + | + | Jk3, Fy3, $Di^b$ ,$Co^a$, Ge3; $Ok^a$, P, LKE, $At^a$, $Cs^a$, Emm, $Er^a$, $Jr^a$, Lan, PEL |
| + | + | + | + | ++ | Kx |
| + | + | + | + | +/0 | Vel |

Reid, Lomas Francis & Olsson: The blood group antigen factsbook 3rd ed. 2012 Academic Press

| Metod / Testery | IG DTT | IG Tryp. | IG alt | IG Pronas | | | Kontr DTT |
|---|---|---|---|---|---|---|---|
| AK2 | ++ | ++ | + | ++ | | | — |
| AK5 | ++ | ++ | + | ++ | | | +sv |
| AK8 | ++ | ++ | + | ++ | | | +sv |
| | | | | | | | |
| | | | | | Obehandlade | | |
| Kontroller | -k | -M | -$Fy^a$ | -$Fy^a$ | -M | -$Fy^a$ | -k |
| AK2 | — | — | — | — | +++ | ++ | — |
| AK5 | +sv | — | — | — | +++ | — | +++ |
| AK8 | — | — | — | — | — | +++ | +++ |

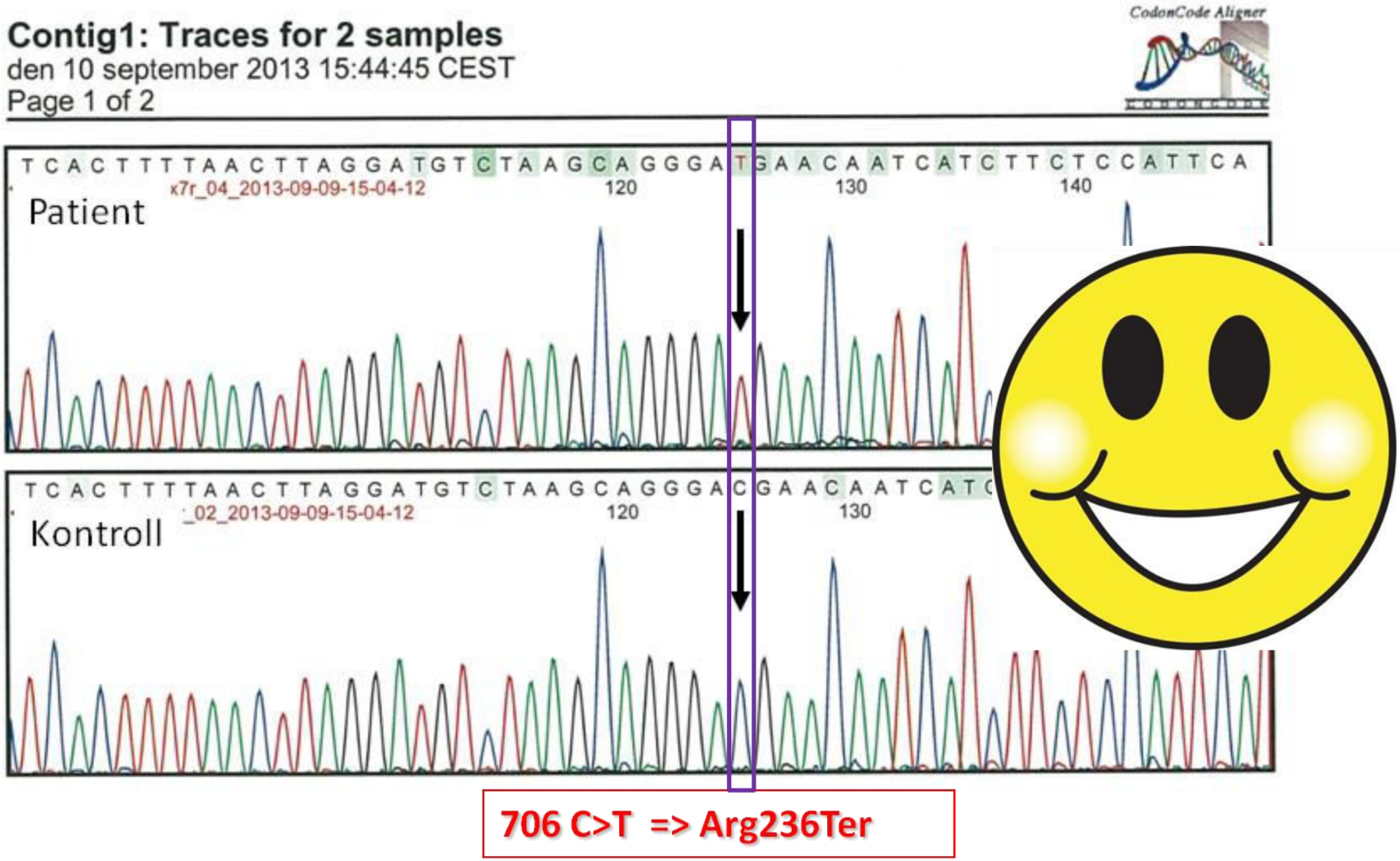
| Papain | Trypsin | α-ct | Pronase | DTT | Possible specificity |
|---|---|---|---|---|---|
| + | + | + | + | + | ~~Jr~~$^a$, ~~Fy~~$^3$, ~~Di~~$^b$, ~~Co~~$^a$, Ge3; ~~Ok~~$^a$, ~~P~~, ~~Lu~~, ~~Kn~~E, ~~Ay~~$^a$, Cs$^a$, Emm, Er$^a$, Jr$^a$, ~~Ly~~n, PEL |

| | IG | IG | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SR092001 | | ++ | | | | | | | Cs(a-) |
| 3-6002 | | + | | | | | | | D1(b-) |
| 10482582 | | — | | | | | | | |
| 8411 96781 | | + | | | | | | | |
| AK8 | ++ | | | | | | | | |
| MC32 | — | | | | | | | | Jr(a-) |
| 6011 5395 | — | | | | | | | | Jr(a-) |

No anti-Jr$^a$ available for phenotyping

| Reference allele *ABCG2*01* encodes Jr1 (Jr$^a$) | | | | |
|---|---|---|---|---|
| **Phenotype** | **Allele Name** | **Nucleotide change** | **Intron/ Exon** | **Amino acid change** |
| Jr(a+) | *ABCG2*01* | | | |
| Null phenotypes | | | | |
| Jr(a−) | *ABCG2*01N.01* | 376C>T | Exon 4 | Gln126X |
| Jr(a−) | *ABCG2*01N.02.01* | 706C>T | Exon 7 | Arg236X |
| Jr(a−) | *ABCG2*01N.02.02* | 34G>A<br>706C>T | Exon 2<br>Exon 7 | Val12Met<br>Arg236X |
| Jr(a−) | *ABCG2*01N.03* | 736C>T | Exon 7 | Arg246X |
| Jr(a−) | *ABCG2*01N.04* | 337C>T | Exon 4 | Arg113X |
| Jr(a−) | *ABCG2*01N.05* | 784G>T | Exon 7 | Gly262X |
| Jr(a−) | *ABCG2*01N.06* | 34G>A<br>1591C>T | Exon 2<br>Exon 13 | Val12Met<br>Gln531X |
| Jr(a−) | *ABCG2*01N.07* | 187_197delATATTATCGAA | Exon 2 | Ile63TyrfsX |
| Jr(a−) | *ABCG2*01N.08* | 542_543insA | Exon 6 | Phe182ValfsX |
| Jr(a−) | *ABCG2*01N.09* | 730C>T | Exon 7 | Gln244X |
| Jr(a−) | *ABCG2*01N.10* | 791_792delTT | Exon 7 | Leu264HisfsX |
| Jr(a−) | *ABCG2*01N.11* | 875_878dupACTT | Exon 8 | Phe293LeufsX |
| Jr(a−) | *ABCG2*01N.12* | 1111_1112delAC | Exon 9 | Thr371LeufsX |
| Jr(a−) | *ABCG2*01N.13* | 34G>A<br>244_245insC | Exon 2<br>Exon 3 | Val12Met<br>Thr82HisfsX |
| Jr(a−) ^ | *ABCG2*01N.14* | 1017_1019delCTC | Exon 9 | Ser340del |
| Altered phenotypes | | | | |
| Jr(a+$^w$) | *ABCG2*01W.01* | 421C>A | Exon 5 | Gln141Lys |
| Jr(a+$^w$) | *ABCG2*01W.02* | 1858G>A | Exon 16 | Asp620Asn |

# *ABCG2* exon 7 sequencing



# Clinical relevance of anti-Jr$^a$

- According to Reid, Lomas Francis & Olsson: The blood group antigen factsbook 3rd ed. 2012 Academic Press
  - Possible reduced cell survival
  - Baby most likely DAT+
  - One report of a fatal case of HDFN
  - Otherwise, not much information

# What did the referring lab do?

- Followed the baby's progress
  - With ultrasound, Doppler MCA
  - Antibody titre
- Purchased 4 units O RhD– Jr(a–) blood from Spain
- Patient delivered v. 39
  - Baby was DAT+
  - Healthy, no blood required

# Why use enzymes?

- Taught that enzymes ”reduce the zeta potential” by removing sialic acid
  - But modification is very specific
  - Can be used selectively
- Sensitivity depends on ”access”
  - Proteins on intact RBCs less accessible than solubilized membranes
- Can be used as a fingerprint
  - Antibodies to high incidence antigens
  - Antibodies to low incidence antigens
  - Can differentiate mixtures of antibodies

# Common ”treating” agents

Proteases:

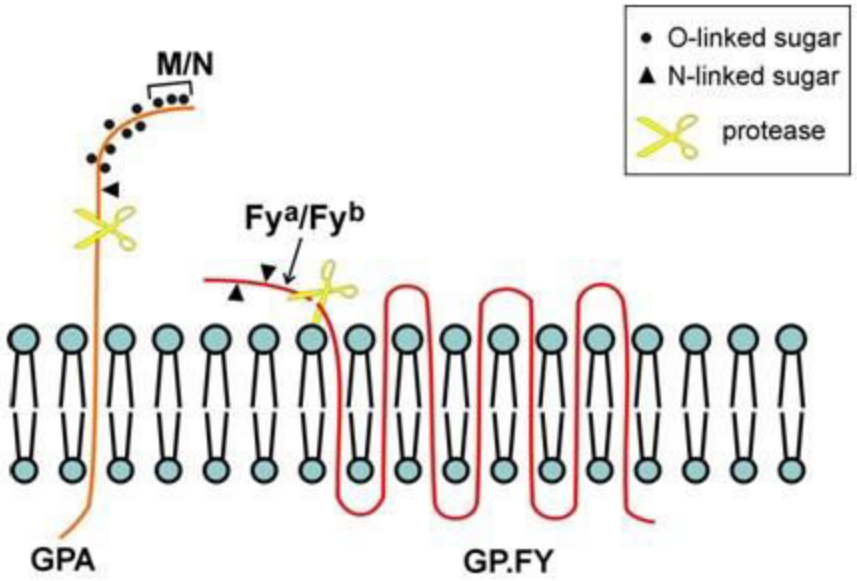
- Papain, Ficin, Trypsin, α-chymotrypsin, Pronase

Glycosidases

- Sialidase

Reducing agents

- DTT,AET



# Case 3

- 2-day old baby
- Hyperbilirubinemia
- Sample sent for group, screen and DAT

| Anti-A | Anti-B | Anti-D | Anti-D | Rh ctrl |
|---|---|---|---|---|
| 0 | 0 | 4+ | 4+ | 0 |

| S I | S II | S III |
|---|---|---|
| 0 | 0 | 0 |

| Anti-IgG | Anti-C3d | Ctrl |
|---|---|---|
| 4+ | 0 | 0 |

Group O, RhD-positive
DAT positive, IgG on RBCs
Antibody screen negative

# What next?

- The baby's RBCs were strongly DAT and had an elevated => suggests hemolysis despite the negative antibody screen
- Mother and baby were both O RhD+
  - Mother had no detectable antibodies at last screen
  - Antibody to a low frequency antigen?
- What can be done?
  - Elute the antibody from the baby's RBCs
  - Test with different RBCs carrying low frequency antigen
  - Test the mother's plasma and baby's eluate with the father's RBCs

# Elution

- Removes IgG (and IgM) from RBCs
  - Acid (low pH)
  - Heat (56°C)
  - Freeze-thaw
  - Ether
- We eluted the antibody using Elu-Kit II
  - Low pH solution (0,3 M Glycine-HCl, pH 3.0)
  - Rebuffer after elution to pH ~7.0
  - 500 uL eluate
  - What RBCs should be tested?

# Testing the eluate

| RBCs | Eluate | Last wash |
|---|---|---|
| S I | 0 | 0 |
| S II | 0 | 0 |
| S III | 0 | 0 |

- Antibody screening RBCs were nonreactive
- Tested rare RBCs thawed for a previous case
  - Based on patient's background
- $Di^b$ has a low frequency partner $Di^a$, so Di(b–) RBCs are Di(a+)

| RBCs | Eluate | Last wash |
|---|---|---|
| Di(a+b-) | 4+ | 0 |
| Di(a+b-) | 4+ | 0 |
| Di(a+b-) | 4+ | 0 |

# Tests with the mother's plasma

| Metod / Testery | IG | | | | | | | | Antigen |
|---|---|---|---|---|---|---|---|---|---|
| S1 | – | | | | | | | | |
| S2 | – | | | | | | | | |
| S3 | – | | | | | | | | |
| J756 | ++ | | | | | | | | Di(a+b-) |
| B4115 | + | | | | | | | | Di(a+b-) |
| GMH | ++ | | | | | | | | Di(a+b-) |
| | | | | | | | | | |

| Titrerad antikropp: Dicyo | | | | Testerytrocyt id: 21 LQ33 266-6 HH | | | | Metod: IAT gel | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Spädning** | **1** | **2** | **4** | **8** | **16** | **32** | **64** | **128** | **256** | **512** | **Titer** |
| **Resultat** | ++ | ++ | ++ | ++ | ++ | ++ | ++ | ++ | + | – | 256 |

| | |
|---|---|
| **Datum** | 13/9 |
| **Satt** | LL |
| **Läst** | LL 14 |

**1:256 = High titre antibody**

# Notes on $Di^a$

- $Di^a$ and $Di^b$ are antigens in the Diego blood group system on Band 3
  - Anti-$Di^a$ first discovered as the cause of fatal HDFN
- $Di^a$ is a very low incidence antigen across Europe but varies greatly in other populations:
  - South America >25%
  - Native Canadians (Chippewa) 11%
  - Native Americans 4%
  - Chinese 4 – 10%
  - Japanese ~13%
  - Hispanics 1%
  - Polish 0.5%
- Not included in our antibody screening RBCs

# Clinical progress of the baby

- Treated originally with phototherapy
- Received 1 unit of ”baby” blood one week post-partum
- No further transfusions since then
  - Control sample requested in 6 months
- Sample received from the father
  - RBCs type (Di(a+b+)

# Thank you!

Questions??